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A FAMILY OF NESTLINGS.

BY D. E. OWEN.

OBSERVERS who have watched the growth of nestlings, from the hatching of the eggs to the abandonment of the nest by the young birds, often have been struck by the rapidity of the development witnessed; but, owing to the difficulty of obtaining quantitative data, exact information on this branch of bird study is meagre. In order to formulate an accurate record of the growth of a nestling, it is necessary to weigh the bird, at stated intervals, for as long a period as possible. This operation, it is needless to say, bristles with embarrassments. The unfavorable conditions for careful manipulation of the balance that obtain in field and thicket, especially during wet or windy weather, taken in conjunction with the inaccessibility of many nests and the inconvenient situation of most, render the study of ornithology, along such experimental lines, a pursuit characterized by trial and disappointment. Occasionally, however, a peculiarly favorable opportunity — such as the one about to be described — enables the observer to obtain facts of sufficient value to justify the labor involved in the research.

Early in June, 1898, the writer of these notes built a small camp at Saco Ferry, Maine. The building was placed over an old cellar, a portion of which only was utilized, the remainder, which lay in the rear of the camp, being left uncovered as a sort of sunken back-yard. Into this grass-grown excavation the refuse building materials had been thrown, and it was while we were clearing away the rubbish that a nest of a Song Sparrow (*Melospiza fasciata*) was discovered, snugly ensconced beneath a half-buried brick that protruded from the sloping wall of the ruined cellar. The nest contained several eggs which were increased in a few days to the full complement of five. On the 14th of July, four of the eggs hatched, and at our morning call the next day, we were confronted by five gaping red mouths, accentuated by big black eyes, and barely supported by five feverish, naked little bodies; and when, by means of a teaspoon, properly warmed, we had removed one of the birds for more minute inspection, we were alternately amused and stricken with concern, as the flabby

youngster strove to poise himself and lift his heavy head for the expected morsel, only to collapse, ignominiously, into a panting heap.

We had provided the camp with a balance, sensitive to one-tenth of a gram, and conveniences for weighing in the shape of sundry pill-boxes for confining the birds. To this apparatus we bore our infant of the teaspoon and found that he tipped the scale-pan at two and nine-tenths grams, or a little more than a tenth of an ounce. A cautious dab of carmine on the back would serve, we thought, by its bright hue, to distinguish our subject from his mates, and with this decoration we restored him to the nest. The next day we made discoveries that led us to modify our procedure. We found that, by chance, we had selected and marked for experiment the smallest bird in the brood, the runt, in brief,—the last bird, probably, to hatch. Moreover, the carmine had not proved an unqualified success, since the friction of the old birds' feathers and the scrubbing together of the young birds in their cramped quarters had nearly erased the generous daub originally bestowed. Apprehensive lest we might, some day, be unable to recognize the chosen bird, and desirous, also, of getting a better idea of development than the smallest bird might be expected to show, we decided to weigh the whole brood, at 12.30 P. M., daily, and take the average as the basis of our calculations and inferences. This system was put into practice at once and continued for six days, all the birds being weighed and a separate record being kept of the marked bird which, as it proved, we were always able to distinguish. The result may be tabulated as follows:

<i>Marked Bird.</i>		<i>Average of the Brood.</i>	
Date.	Weight.	Date.	Weight.
July 15.	2.9 gms.	July 16.	5.80 gms.
" 16.	4.5 "	" 17.	8.62 "
" 17.	7.2 "	" 18.	10.91 "
" 18.	9.0 "	" 19.	13.68 "
" 19.	12.6 "	" 20.	15.44 "
" 20.	14.1 "	" 21.	16.58 "
" 21.	16.0 "		

We were, in a measure, prepared for noteworthy results, but we were not prepared for the rapidity of growth that the table records. The family whose members increase in average weight 48% in twenty-four hours is a thriving one indeed; yet this is the rate of increase of the nestlings for July 16-17. The rate falls off after the latter date, becoming successively, 25%, 20%, 13%, and, finally, 7% in a day. Most interesting and suggestive are the figures showing the growth of the marked bird. It is a common impression that the runt of the brood has a bitter struggle for existence, being, by reason of inferior strength, largely at the mercy of its greedy fellows and crowded out of much-needed food in consequence. The results above noted would seem to imply that in well-regulated feathered households, at least, the doctrine of the survival of the fittest is warmly tempered by justice and mercy. At all events, the smallest Song Sparrow grew phenomenally. He picked up 55% in weight the second day of his life and save on a single day his increase never failed of being from 6% to 20% above the average! Beginning existence as the smallest of the lot and weighing, the second day, 1.3 grams less than the average, the marked bird grew, in a week, to weigh only half a gram, or about $\frac{1}{56}$ of an ounce less than the average, a record which bears testimony to abundant nourishment and a good digestion.

The rapid increase in weight of the nestlings needs no theorizing to account for it. The devotion of parent birds to their young and their industry in providing food are proverbial; but no one who has neglected to sit watch in hand, within range of a nest of five importunate, half-fledged youngsters can formulate an adequate conception of the fidelity with which birds discharge their parental duties. We made it a point to watch the nest of Song Sparrows in the old cellar from the camp window, whenever, through the day, it chanced to be convenient. With watch or clock before us and writing materials at hand, we sat at intervals of from fifteen minutes to an hour and a quarter at a time, accurately noting the visits of the parent birds. It was absorbing and exacting work. The old birds never flew directly to the nest, but approached it by stealthy stages, alighting now on a rock, now on the camp, again on a small bush. A rapid scrutiny of the cellar,

a quick flit, a scramble through the grass and a sudden disappearance, this was the usual programme. A few seconds later the grass blades would be separated very quietly, and the bird might be seen standing for a brief moment perfectly still; again the quick flight and the visit was over. The male was in the habit of alighting on a small bush, some twenty-five yards from the cellar, for a brief song, before renewing his search for the grubs and the insects which supplied the family larder; but the female never slackened her assiduity.

Back and forth, back and forth, from sunrise until sunset, the parent birds journeyed to and from the nest at the average rate, for the time we watched, of a visit by one of the birds every 4.75 minutes. On the whole, the feeding became more frequent as the nestlings grew. Thus in the two hours and thirteen minutes that we watched the nest, July 19, the birds made a total of twenty-six visits, or one every five minutes, while July 21, the average interval was 3.24 minutes. On the last named date we recorded the visits to the nest during some part of every hour but one between five o'clock in the morning and eight o'clock in the evening; and it is worthy of mention that the most frequent visits during this day were made between three and four o'clock in the afternoon when a thunder shower was passing over the locality. In the midst of a pouring rain the parent birds carried food to their brood every two minutes! Between seven and eight o'clock the calls were still at the rate of one in two and eight-tenths minutes; but we were unable by observation on this or any other day to discover any constant relation between the rate of feeding and the time of day.

It remains to explain why our observations on the Sparrows were not extended over a longer time. One week seems a brief period to follow the life-history of so interesting a family, but, unfortunately, the precocity of the members rendered a longer intimacy out of the question. The increase in weight that has been described was accompanied by other features of development. When the first weighing was done the young birds were weak and submitted with the passive philosophy born of innocence and inability; but the operation was not long to remain so easy. By July 18, the big eyes, which up to this time had

been covered with a thin translucent film, began to open. With the awakening to things visible came a greater liveliness and a tendency to be afraid which found voice, the following day, in loud chirps of alarm. These gave place, July 20, to genuine squawks and July 21, when we took the brood from the nest for the usual weighing the remonstrance was so boisterous as to summon the old birds which hovered about, much disturbed, until the experiment had been concluded. Finally, on the 22nd of July, we found the nestlings too lively to be handled and in our efforts to capture the lot we lost one altogether. Search as we might, we could discover no trace of the missing bird which, but a moment before, had been standing on the grass close to the nest. Misgivings consumed us for the remainder of the day; but we were destined to be reassured. On the following day, the young birds, now fully fledged, and able to fly a few feet, one by one left the nest and were led by the parents to a clump of weeds and bushes a few yards away. It was the final surprise of our week's observations to see the vigor with which the young birds followed the old birds, by easy stages, across the field, now running in the grass, now essaying a miniature flight. Within an hour these Song Sparrows of a week had justified the arduous attentions of the parent birds by removing, one by one, to the clump of small growth, to which, no doubt, the nestling lost the previous day had been conducted. For a day or two an occasional familiar chirp from the weeds assured us that the family was still intact; but we saw little more of either old or young.